RICHMILL 4th AXIS

Sud

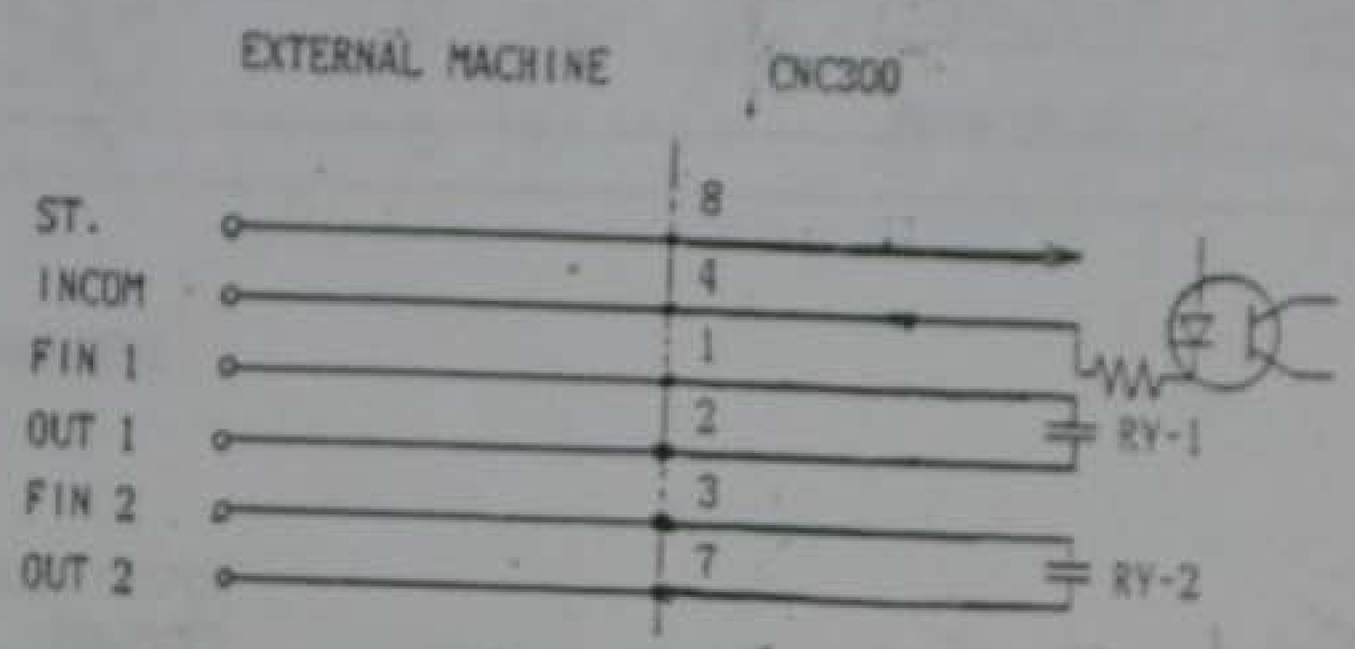
《CONNECTING WITH AN EXTERNAL MACHINE》

When performing the automatic operation interlockingly with an external machine, supplied signal cable.

When ST. and INCOM are on, the table performs one step of indexing, and then outp step complete signal.

Outputting method of step complete signal can be deter mined by setting program parameter.

INPUT/OUTPUT CONNECTING DIAGRAM OF CNC300



A. CONNECTING WITH NC MACHINE (MACHINING CENTER)

Connect signal lines ST.INCOM to M-signal (normally open) terminals of the relay, FIN 1, OUT I to M-complete signal input terminals of the relay.

Set the parameter PA01 to 1(on) and PA02 to 0(off).

B. Connecting with MILLING MACHINE, DRILLING MACHINE, MACHINE WITH AUTOMATIC CYCLE FUNCT other GENERAL-PURPOSE MACHINE

Connect signal lines ST.INCOM to limit SW, relay (normally open), etc.

When cycle counter is used.

Complete signal is needed.

Set the parameters for PA01-1(on), PA02-0(off), when parameter is set to PA13-1(on ⌐⊏ at the final process is set to 2, the buzzer sounds after completion of the fir process.

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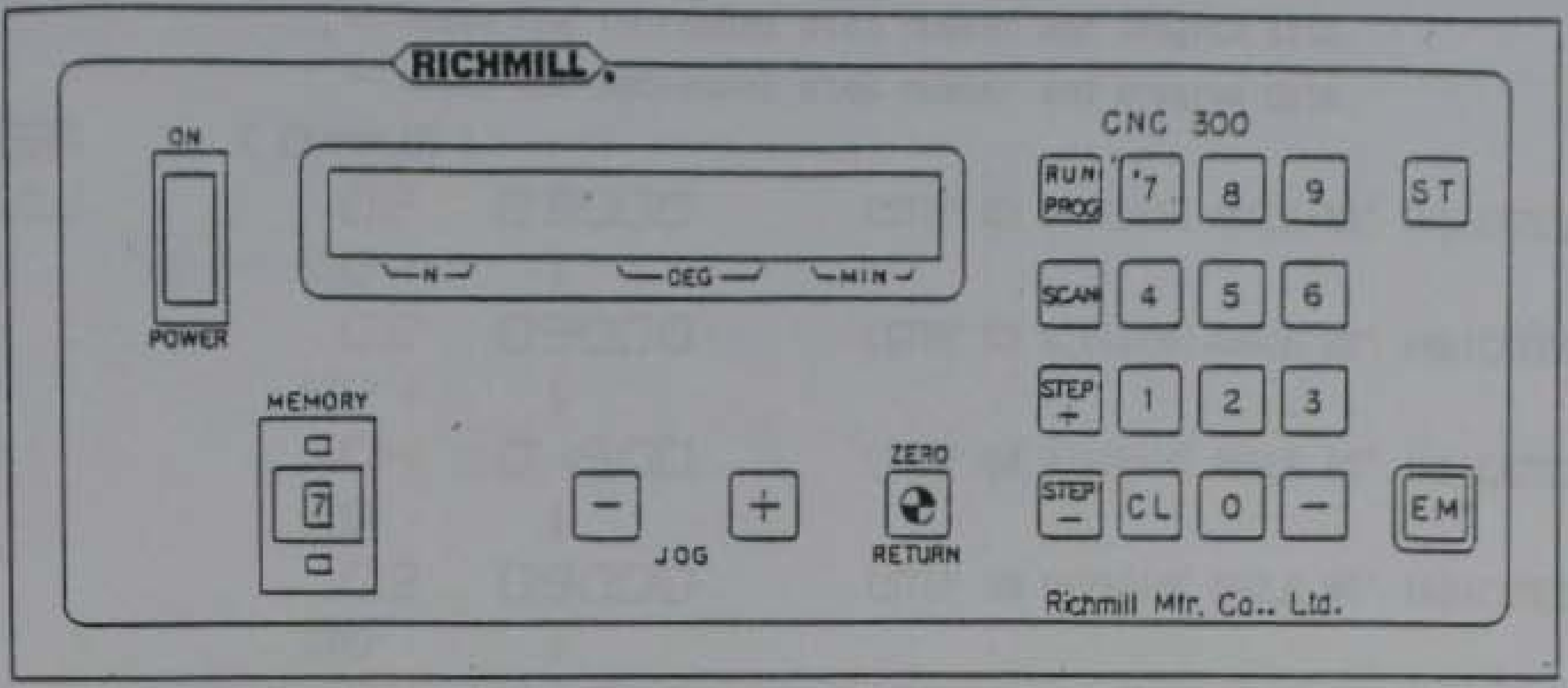
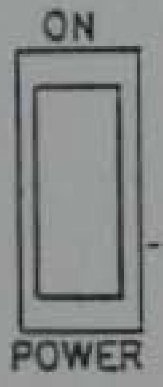
CONTROL PANEL OF CNC300



EXPLANATIONS FOR KEYS



POWER SWITCH
(ON/OFF)

ST

STARTING KEY
This key executes starting the steps programmed

EM

EMERGENCY STOP KEY
Press this key in an emergency. Motor will be immediately stopped by turning on this key.
At the time of stopping revolution, this EM key cannot be operated.
Turn on the power again when "Error" is indicated after emergency stop.
As the present position is not retained, reset to Zero.

+

−

JOG KEY
This key is used when manual starting to the designated direction is required.
Jog key selects three speed operation.
1) Press this key and release immediately, and one step movement of motor (degree 0.48) is accomplished.
2) When the key is pressed for 2 or 3 seconds, the ROTARY TABLE starts rotating at 0.15 rpm.
3) When the key is pressed further more, ROTARY TABLE rotate at 1 rpm.

STEP +

STEP −

STEP KEYS (PLUS, MINUS)

This key calls and indicates the memoried program data.

+ Means one increased step number and program data.

− Means one decreased step number and program data.

(EXAMPLES)

02 03000 (STEP 02 DIVIDING ANGLE 30° INDICATES)
STEP + ↓
03 09000 (STEP 03 DIVIDING ANGLE 90° INDICATES)
STEP + ↓
04 01500 (STEP 04 DIVIDING ANGLE 15° INDICATES)
STEP - ↓
03 09000 (STEP 03 DIVIDING ANGLE 90° INDICATES)
STEP - ↓
02 03000 (STEP 02 DIVIDING ANGLE 30° INDICATES)

CL

CLEAR KEY

Clear key selects three functions.

1) In the RUN MODE, this key resets the displayed ROTARY TABLE POSITI
"0"(ZERO).

2) In the PROGRAM MODE, this key clears the input program data .
When the key is pressed again, the former data is displayed.

3) This key can also erase a program stored in a memory.

《METHOD OF ERASING A PROGRAM IN A MEMORY》

1) Set to the PROGRAM MODE.

2) Call the memory number to be erased by pressing the MEMORY SELECT B

3) Press the clear key for 5 seconds.

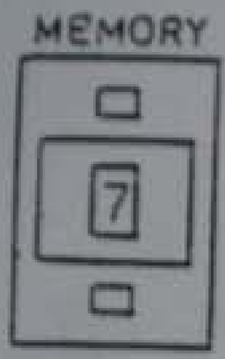
4) 5 seconds after pressing this key, all the programs are cleared, an
data is set to step number 01. and displays as follows:

RESET	Hr	00
FEED RATE	F	60
LOOP COUNT	L	001
REMOTE CONTROL	rc	1

ZERO RETURN KEY (RESET KEY)

When this key is pressed, the ROTARY TABLE will return to "0"(ZERO) position at MAX. rpm.

Its rotation is an opposite direction which is programmed in the step No.01.



MEMORY SELECT BUTTON

7 sets of the memory is available to store up to 99 steps in each memory.
Memory selection is executed by using PROGRAM MODE only.
Memory selection in RUN MODE executes the program data before being changed.
MEMORY SELECT BUTTON 8.9.0 is to set to memory No.1.

MODE KEY

RUN MODE or PROGRAM MODE can be selected.

1) In PROGRAM MODE, the display will be blinking, and input or changing of program and memory selection is possible.
2) In RUN MODE, the display will be steady, and ready to execute input program

DISPLAY SCAN KEY

This key is used for changing the display mode.
In RUN MODE
(EXAMPLES)

	INDICATES
01 P03000	PRESENT POSITION
↓	
01 0 1000	DIVIDING ANGLE
↓	
01 F 60	FEED RATE
↓	
01 L 001	LOOP COUNT
↓	
01 rc 1	REMORTE CONTROL
↓	
01 P03000	
↓ REPEAT	

In PROGRAM MODE
present position is not indicated.

《COMMAND CODE》

Hr 00 [ZERO-RETURN]

This code is used to return ROTARY TABLE to "0"(ZERO).
When reset is already done, it cannot be operated.
It takes an opposite direction which is programmed in the step

End 99 [PROGRAM END]

This code is used for program end.
After completing the step of END 99, automatic run comes to end then return to the step 01.

Arc 98 [ARC ANGLE DIVISION]

This code is the command for arc angle division.
When this code is used, any arc angle can be divided equally by numbers between 2 and 999.
To use this function, 2 steps are required.

first step : equal dividing
second step : specifying of angle

noP 97 [DWELL]

This code is used for timer.
This will enable the LOOP COUNT for 1~999.

DWELL		LOOP COUNT INPUT
0.1 SECOND	———————→	L 1
⋮		⋮
99.9 SECONDS	———————→	L 999

JP 96 [JUMP FUNCTION]

This code allows to jump to any step you need.
At the same time, it executes the program jumped.

rJP 95 [RETURN JUMP FUNCTION]

This is used for returning to the increased step , and then exec the program after jumping.

《METHOD OF INPUT THE COMMAND CODE》

INPUT AS FOLLOWS :

Hr 00 ---→ 0
End 99 ---→ 99
Arc 98 ---→ 98
noP 97 ---→ 97
JP 96 ---→ 96
rJP 95 ---→ 95

《PARAMETER SETTING》

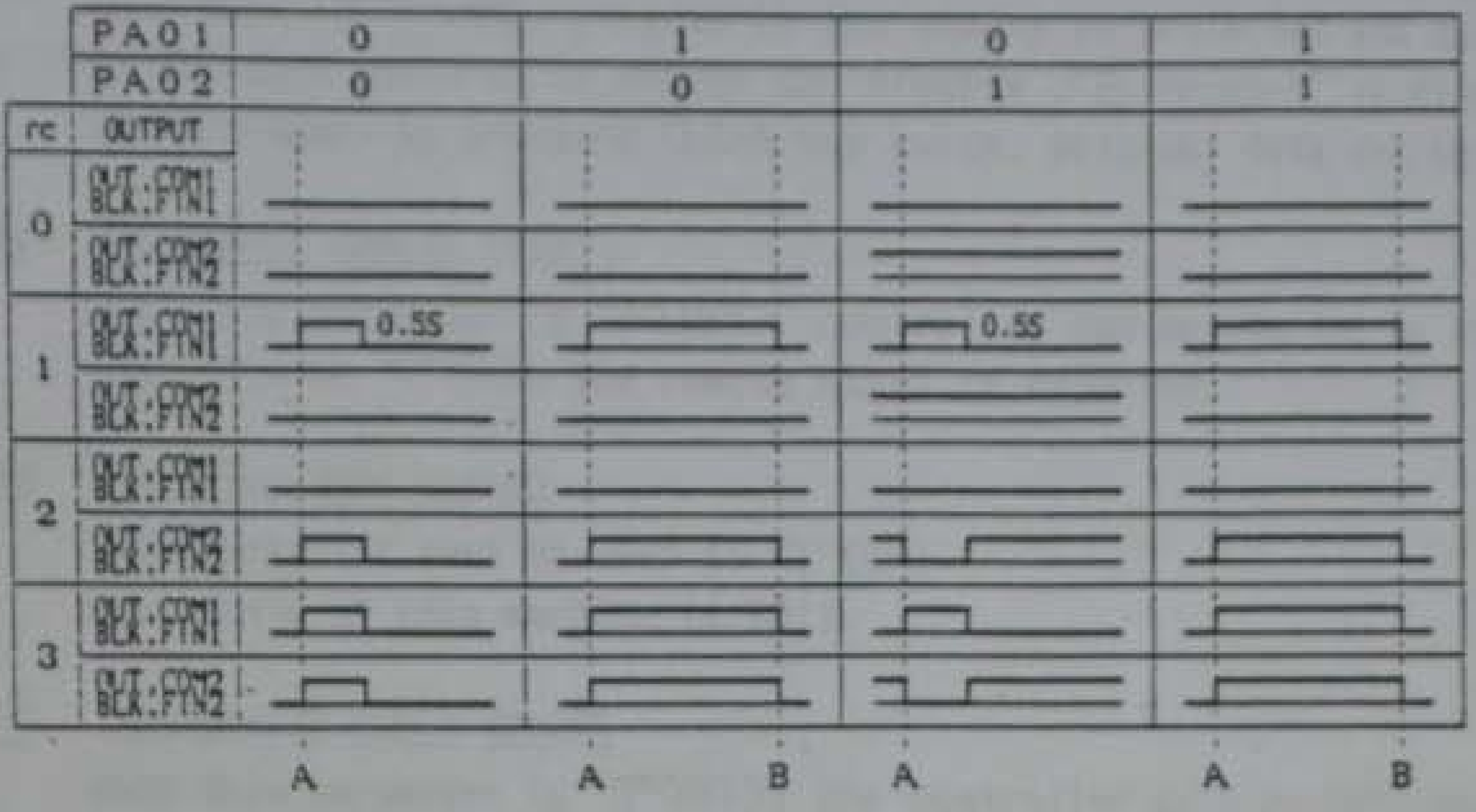
1) Change the mode to PROGRAM MODE.
2) Press STEP− key for 5 seconds.
3) It is changed to PA 01, and possible to set parameter.
4) Call any parameter by pressing STEP+ key.
5) When you wish to change, use "0"(OFF) or "1"(ON).
6) Press the MODE key after changing, and then parameter setting is completed.

PARAMETER TABLE

PARAMETER No.	FUNCTIONS
PA01	INPUT / OUTPUT CHANGE
PA02	
PA03	DECREASE THE FEED RATE AND ACCELERATION RATE BY 50% 0:NORMAL 1:1/2 DOWN
PA04	HALF THE STEP MOTION 0:NORMAL 1:1/2 STEP
PA05	DOUBLE REMOTE 0:NORMAL 1:DOUBLE REMOTE
PA06	DISABLES START KEY AND ZERO-RETURN KEY 0:NORMAL 1:DISABLE
PA07	MEMORY PROTECTION (PROHIBIT TO CHANGE PROGRAM) 0:PERMIT 1:PROHIBIT
PA08	DISABLES REMOTE START 0:NORMAL 1:DISABLE
PA09	SETTING GEAR RATIO 1: 90:1
PA 10	AUTOMATIC CYCLE START 0:IMPOSSIBLE 1:POSSIBLE
PA 11	REVERSING MOTOR ROTATION 0: CW 1: CCW
PA 12	BLOCKING OF RELAY FOR CNC INTERFACE 0:NORMAL 1:BLOCK
PA 13	BUZZER SETTING 0:OFF 1:ON
PA 14	AVAILABILITY OF AIR CLAMPING FUNCTION 0:USE 1:UNUSE
PA 15	SETTING OF RAPID FEED SPEED 0:F 60 1:F 40

《 EXPLANATION OF PARAMETERS 》

PA01、PA02 [INPUT / OUTPUT SIGNAL SETTING]



A: INDEX COMPLETE
B: INDEX INPUT OFF

When parameter PA01, PA02 is changed, turn off the power switch once, and then it on again.
When PA12 is "1"(ON), index fin signal is not supplied.

PA03 [ACCELERATION / DECELERATION AND SPEED HALVING]
When the parameter is "0"(OFF), motor operates at specified speed.
When the parameter is "1"(ON), the speed of index, acceleration / deceleration is halved.
Halving of the speed is possible by using parameter PA03 and PA04.
For the relation between speed and parameter, refer to F function.

PA04 [MOVING ACTION OF 1/2 STEP]
When this parameter is "0"(OFF), feed rate is normal.
When this parameter is "1"(ON), feed rate is 1/2 step.
Feed rate is related to PA03. (refer to F function)

PA05 [DOUBLE REMOTE]
When this parameter is "0"(OFF), the remote switch can start the controller. Whenever the remote switch is closed.
When this parameter is "1"(ON), the controller can be started by operating the switch as follows : closed first, opened again, closed and opened again.
This switch must be set to close for minimum of 0.01 second, and to open for minimum of 0.1 second.
This parameter can be used when you wish to index only once by operating the switch twice.

PA06 [DISABLES START KEY AND ZERO-RETURN KEY]
When this parameter is "0"(OFF), both START key and ZERO-RETURN key operate.
When this is "1"(ON), both are disabled.

PA07 [MEMORY PROTECTION (PROHIBIT TO CHANGE PROGRAM)]

When this parameter is "0"(OFF), program in the memory can be changed.
When this is "1"(ON), program in the memory is protected and cannot be changed.
So although you wish to change the program ,"Error" is displayed and rejecte
In this case, by pressing CLEAR key twice, original data can be returned.

PA08 [DISABLES REMOTE START]

When this parameter is "0"(OFF), controller can be started by remote start.
When this is "1"(ON), the remote start is rejected.

PA09 [SETTING GEAR RATIO]

This parameter must be used at "1"(ON).
Gear ratio of this machine is 90:1.

PA 10 [AUTOMATIC CYCLE START]

When this parameter is "0"(OFF), the controller will do only one step by only one start signal.
When this is "1"(ON), the controller will move to further steps automatically.
You can use for the confirmation of programs.

PA 11 [REVERSING MOTOR ROTATION]

When this is "0"(OFF), motor rotate in the direction CW. and when this is "1"(ON) rotation is CCW.
If the motor is fixed to left side of machine, its rotation is CW (0) direction.
When you wish to fix it to right side, set the parameter "1"(ON), and then rotary table moves in CW direction.

PA 12 [BLOCKING OF RELAY FOR CNC INTERFACE]

When this is "0"(OFF),index complete relay is operated by the combination with PA0 PA02 and rc.
When this is "1"(ON), both complete relays do not operate.

PA 13 [BUZZER SETTING]

When this is "0"(OFF), the buzzer will not sound.
When this is "1"(ON), the buzzer will sound for one second after completing of indexing by outputting to cable OUT.COM2 and BLK.FIN2.
(Only when rc is 2 or 3 and cable INCOM and ST are input.)

PA 14 [AVAILABILITY OF AIR CLAMPING FUNCTION]

Use this parameter with it turned "0"(OFF), without fail.
As no clamping is required, this parameter is used at "1"(ON), when air is not connected.

PA 15 [SETTING OF RAPID FEED SPEED]

When this is "0"(OFF), F 60 is stored in the erased memory, and when this is "1"(ON), F 40 is stored.

《CAUTION FOR RUNNING》

This unit is designed at duty cycle 50%, 10 minutes rest is required after 10 minutes run.

Do not operate over 10 minutes continuously for jog run especially.

Duty cycle is 40% when it is used at jog run or feed rate F 0, and 70% when F 60.

Controller is to be set in a clean place where no chips or no coolant come, and never cover the unit with vinyl sheet.

《TROUBLE SHOOTING》

TROUBLES	CORRECTIONS AND POSSIBLE CAUSES
Power switch is on, but the switch and display do not light up.	No power is supplied to controller. Check the power cable connection, fuse and voltage.
The display changes in manual/automatic running, but the table does not rotate	Check the connection of motor cable and fuse. Check also if the table may be over-loaded.
The table rotates.but stops at earlier position than required.	The table is over-loaded. Try to lessen the load or operate at lower feed rate. Check that the parameter PA09 is set to "1"(ON). (PA09=setting of gear ratio)
ST.key is pressed, but table does not start indexing.	Check the mode. Set to RUN MODE if it is set to PROGRAM MODE. Also check the parameter PA06, if it is "1"(ON), set it to "0"(OFF).
Remote start switch is pressed, but table does not start indexing.	Check that the signal cable is connected. Also check the parameter PA08, if it is "1"(ON), set it to "0"(OFF).
Error is displayd when the program is input or changed.	Check the parameter PA07, if it is "1"(ON), set it to "0"(OFF).
Motor does not rotate after taking measures, such as cable connecting parameter checking, and over-load lessenning.	Remove top cover of controller and check if the PL lamp of driver unit lights up. If it does not light, driver-circuit may be troubled. Then, turn power on after removing the motor cable once. If PL lamp light up, short-circuit of motor side may be the cause of trouble. In this case, contact the maker soon. The time for power on with motor cable removed must b within 5 seconds.
CPU Error	When the data in display is erased, getting darker, o showing wrong informations or racing of motor happens Check the voltage of power source. If the voltage is normal, repeat turning on and off the power switch several times. But if the trouble cannot be solved still, contact th maker soon.
Abnormal over-heating of motor	Althogh whole checking is done before packing, the condition of controller may be changed by the vibration during long transportation. Check it by following methods the below. Remove top cover of controller, and apply the tester to terminal CP, +, −, of driver unit. Normal voltage is about 2.0V.DC when motor is stopped, and about 6.3V.DC when motor is rotating. If abnormal voltage is checked, adjust it with volume RUN and STOP.

《SELF CHECK FUNCTION》

E 0 (Controller soft Error)	If Error code is displayed even after repeating turning on and off the power switch, ROM is defective. Then, contact the maker.
E 1 (Key switch trouble)	Some key switch is left contacted when power switch is turned on. Replace the defective switch with new one.
E 3 (Program Error)	Program contents are not the same as parameter setting. Clear the display with CL key, and then check again program contents and parameter setting.
E 4 (Unclamp Error)	It is displayed when unclamping signal is already input while indexing is operated. Possible cause will be shortage of pneumatic pressure for clamping, wrong connecting of limit switch, disconnection of cables or defect of solenoid valve. If they are all right, check the action of relay RY-3 mounted inside of controller.
bALo	When this is displayed, replace battery with new one immediately, because the performance of battery is getting lower

《ADJUSTING METHOD OF BACKLASH》

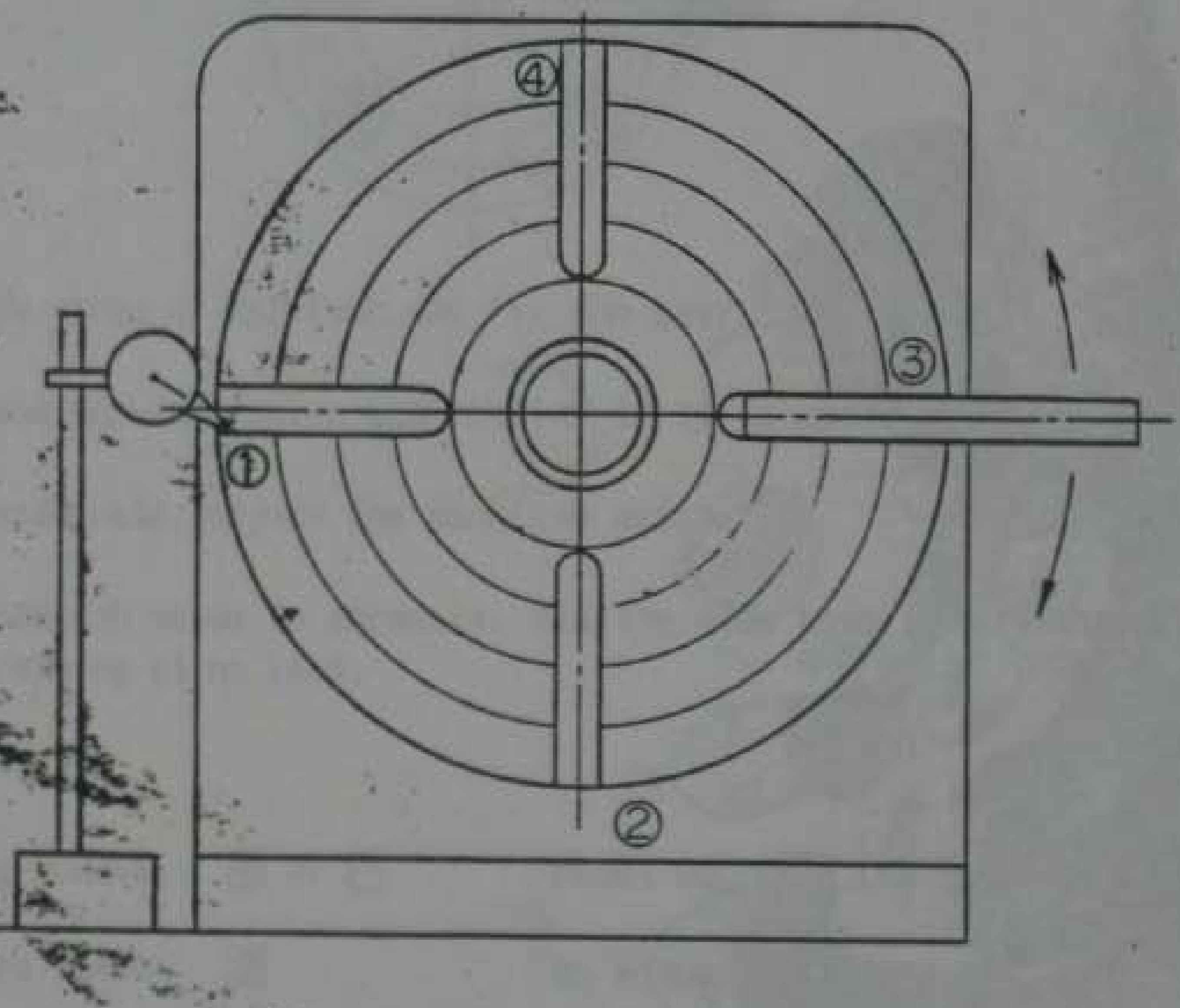
I. Measuring of Backlash

※ When air is used, measure with power source turned OFF, because Clamping is done when power source is turned ON.

① Apply Test-Indicator to the T-slot of table face.

② Fix the bar to other T-slot by suitable method, and read the difference of Test-Indicator when Table is turned to CW & CCW.

③ Do the test at 4 points by turning this test to each 90°.



When the difference of Test-Indicator's reading is

within 0.006 ~ 0.010 mm (0.00024 ~ 0.0004 inch)

Backlash is adequate.

When the difference is larger than allowance, please do Backlash adjustment.

When Backlash is adjusted, choose the point of the minimum reading of Indicator among 4 points.

For example, if point ② of above figure is minimum value, adjust the backlash by turning the T-slot of ② to Indicator.

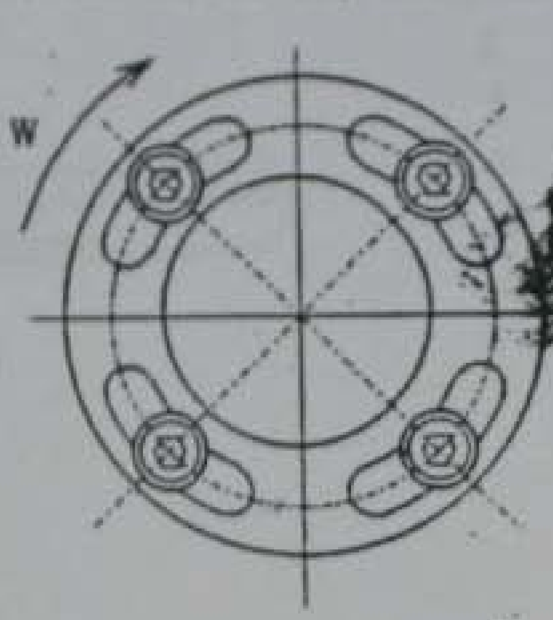
《 BACKLASH ADJUSTING METHOD》

Ⅱ. Adjustment of Backlash

① Remove the side cover, and loosen the bolt for fixing the gear case.

※ When the side cover is removed, take caution against the flowing-out of lubricati[illegible] oil inside of Body.

② When the gear case is turned to CW, Backlash value becomes small.



③ Adjust the value of Backlash and fix the gear cas[illegible]

④ Measure the Backlash value and confirm if it is adequ[illegible]

If it is inadequate, adjust the Backlash again.

⑤ If the Backlash value is adequate, fix the side cover, pour lubricating [illegible] do trial running at no load.

[TRIAL RUNNING]

1. Jog Running	⊞ or ⊟	about 90° CW & CCW
2. Zero Return	⊗	by manua[illegible]
3. Continuous Running		by using Program

Parameter No.10 → 1
No.14 → 0 (When air is used)

```
N 01 θ 360.00 L50 F60 rc 1
N 02 θ-360.00 L50 F60 rE 1
N 03 End 99
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⑥ If Spindle comes to stop turning by above said running, it means that the Backlash is too small, so adjust again.

⑦ After completing trial running, confirm the clearing of program and parameter No. 10 which is the cancellation of Continuous Running.